

ABSTRACT

A nonconductive hydrogen barrier layer completely covers the surface area over a memory capacitor and a MOSFET switch of an integrated circuit memory cell. The nonconductive hydrogen barrier layer and a conductive diffusion barrier beneath
5 the capacitor together provide a continuous diffusion barrier between the capacitor and a switch. Also, the nonconductive hydrogen barrier layer and the conductive diffusion barrier continuously envelop the capacitor, in particular a ferroelectric thin film in the capacitor. Preferably, a nonconductive "buried" diffusion barrier layer is disposed over an extended area, providing a continuous diffusion barrier between
10 the capacitor and the switch. A preferred fabrication method comprises forming a thin stack-electrode layer on a capacitor dielectric layer, and then etching the substrate to form self-aligning capacitor stacks. Thereafter, a top plate-line electrode layer is formed on the capacitor stacks and etched to form a plate-line electrode electrically connected to a plurality of capacitors.